Math 300 Assignment 7.5

ALGORITHM. The Bubble Sort
procedure *bubblesort*($a_1, ..., a_n$: real numbers with $n \geq 2$)
for $i := 1$ **to** $n - 1$
    for $j = 1$ **to** $n - i$
        if $a_j > a_{j+1}$ **then** interchange a_j and a_{j+1}
$\{a_1, .., a_n$ is in increasing order$\}$

ALGORITHM. Merging Two Lists
procedure *merge*(L_1, L_2: sorted lists)
$L :=$ empty list
while L_1 and L_2 are both nonempty
    remove smaller of first elements of L_1 and L_2 from its list; put it at the right end of L
    if this removal makes one list empty **then** remove all elements from the other list and append them to L
return L $\{L$ is the merged list with elements in increasing order$\}$

ALGORITHM. Merge Sort
procedure mergesort($L = a_1, ..., a_n$)
if $n > 1$ **then**
    $m := \lfloor n/2 \rfloor$
    $L_1 := a_1, a_2, ..., a_m$
    $L_2 := a_{m+1}, a_{m+2}, ..., a_n$
    $L :=$ merge(mergesort(L_1), mergesort(L_2))
$\{L$ is now sorted into elements in nondecreasing order$\}$

Use either Maplesoft, MATHLAB, SageMath, or Python for the following exercises.

1. (5 points) Write a computer program that implements the Bubble Sort.

2. (10 points) Write a computer program that implements the Merge Sort. Note that you need to implement the *Merge Two Lists* algorithm first.